

**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Atty. Dkt.: Q67889

Walter WIRZ

Divisional Application of

Appln. No.: 09/475,151

Group Art Unit: Unknown

Confirmation No.: Unknown

Examiner: Unassigned

Divisional Filed: January 16, 2002

For: **PROCESS FOR THE FINE MACHINING OF THE TOOTHED GEARS OF A GEARBOX (AS AMENDED)**

**PRELIMINARY AMENDMENT**

Commissioner for Patents

Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

**IN THE TITLE:**

**Please delete the present title and replace it with the following new title:**

PROCESS FOR THE FINE MACHINING OF THE TOOTHED GEARS OF A  
GEARBOX

**IN THE SPECIFICATION:**

**The specification is changed as follows:**

**Page 1, before the first paragraph:**

This is a divisional of Application No. 09/475,151 filed December 30, 1999, and now allowed; the disclosure of which is incorporated herein by reference.

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Walter Wirz  
Q67889  
Preliminary Amendment

**Page 1, first paragraph:**

The invention relates to a process for the fine machining of the toothed gears of a gearbox.

**Page 2, third paragraph:**

It is the object of the present invention to disclose a process with which the hard fine-machining of the transmission gears of motorized vehicles can be rationalized and improved and which manages with far simpler and less expensive clamping means.

**Page 2, paragraph bridging pages 2-3:**

According to the invention, the machining of the teeth and of the boring of gears is performed in the same fixing and simultaneously. In doing so, the fixing of the workpiece is designed in such a way that the surfaces to be machined remain freely accessible to the appropriate tools. Besides the time savings in the manufacturing, in doing so, automatically a minimum runout between the boring and the gearing is achieved; also the expensive fixing means for clamping the workpiece in the gearing as well as thereafter in the boring for the grinding or honing of the gearing are eliminated.

**Page 3, first full paragraph:**

The implementation of the process according to the invention is made possible thanks to several specific characteristics on disc-shaped gears, as can be found in, for example, the transmissions of motorized vehicles, and the availability of the continuous machining process, for example for the continuous generating grinding process, which requires a rapid and continuous rotation of the workpiece for the machining process. The rotational movement is

Walter Wirz  
Q67889  
Preliminary Amendment

used simultaneous with the machining of the gear in order to machine the boring in a known manner, for example, through internal grinding or honing.

**Page 4, paragraph bridging pages 4-5:**

Fig. 2 shows an enlarged cross-section. The workpiece 6 is fixed using centerings 9 and 10 in its machining position over its two chamfers 17 and 18 on the faces of the boring. The opposite surface of the chamfer 17 at the idler 9 within the range of its support zone 19 is covered with a covering made of fine diamond or another hard material grains. In doing so, the torque necessary for providing the machining force, especially for the generating grinding of the gearing 7, is slip-free transferred to the workpiece. The axial pressing force for achieving the necessary torque is applied by the centering 10 through the bearing 23 from the holder 16. Not only the centering 9 but also the holder 16 are designed such that they lie outside of the collision contour 20 of the grinding worm 5. The centering 10 has a coaxial through-boring 35 and the centering 9 has a coaxial terminal boring 36. Both borings 35, 36 are slightly larger than the finished diameter of the boring 8 of the gear 6. This is for an unhindered accessibility of the bore by the tool.

**IN THE CLAIMS:**

**Claims 4-10 are canceled.**

**Claim 1 is amended as follows:**

1. (Amended) Process for fine machining of functional first surfaces on pre-machined and hardened transmission gear workpieces with a cylindrical boring, said first functional surfaces comprising a gearing, wherein in one and the same fixing of said workpiece

Walter Wirz  
Q67889  
Preliminary Amendment

on second surfaces not requiring hard machining, said gearing according to a continuously working generating grinding process and, at the same time, said boring are machined.

**New Claims 11-14 are added as follows:**

11. Process according to claim 1, wherein said functional first surfaces comprise a frontal surface and wherein the frontal surface is machined at the same time as said gearing and said boring.

12. Process according to claim 3, wherein continuous profile generating grinding is used with subsequent honing in the same mounting.

13. Process for fine machining of functional first surfaces on pre-machined and hardened transmission gear workpieces with a cylindrical boring, said first functional surfaces comprising a gearing, wherein in one and the same fixing of said workpiece on second surfaces not requiring hard machining, said gearing according to a continuously working generating machining process and, at the same time, said boring are machined.

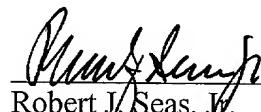
14. Process according to claim 13, wherein said machining process is a gear honing process.

Walter Wirz  
Q67889  
Preliminary Amendment

**REMARKS**

Entry and consideration of this Amendment is respectfully requested. For the Examiner's convenience, a substitute specification has been included.

Respectfully submitted,

  
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Date: January 16, 2002

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Walter Wirz  
Q67889  
Preliminary Amendment

## APPENDIX

### VERSION WITH MARKINGS TO SHOW CHANGES MADE

#### IN THE TITLE:

The title is changed as follows:

~~PROCESS AND DEVICE FOR THE FINE MACHINING OF THE TOOTHED GEARS OF A GEARBOX~~

#### IN THE SPECIFICATION:

The specification is changed as follows:

##### **Page 1, before the first paragraph:**

This is a divisional of Application No. 09/475,151 filed December 30, 1999, and now allowed; the disclosure of which is incorporated herein by reference.

##### **Page 1, first paragraph:**

The invention relates to a process and a device for the fine machining of the toothed gears of a gearbox.

##### **Page 2, third paragraph:**

It is the object of the present invention to disclose a process and a device with which the hard fine-machining of the transmission gears of motorized vehicles can be rationalized and improved and which manages with far simpler and less expensive clamping means.

##### **Page 2, paragraph bridging pages 2-3:**

According to the invention, the machining of the teeth and of the boring of gears is performed in the same fixing and simultaneously. In doing so, the fixing of the workpiece is designed in such a way that the surfaces to be machined remain freely accessible to the appropriate tools. Besides the time savings in the manufacturing, in doing so, automatically a minimum runout between the boring and the gearing is achieved; also the expensive fixing means for clamping the workpiece in the gearing as well as thereafter in the boring for the grinding or honing of the gearing are eliminated.

**Page 3, first full paragraph:**

The implementation of the process according to the invention is made possible thanks to several specific characteristics on disc-shaped gears, as can be found in, for example, the transmissions of motorized vehicles, and the availability of the continuous generating grinding process, for example for the continuous generating grinding process, which requires a rapid and continuous rotation of the workpiece for the machining process. The rotational movement is used simultaneous with the machining of the gear in order to machine the boring in a known manner, for example, through internal grinding or honing.

**Page 4, paragraph bridging pages 4-5:**

Fig. 2 shows an enlarged cross-section. The workpiece 6 is fixed using centerings 9 and 10 in its machining position over its two chamfers 17 and 18 on the faces of the boring. The opposite surface of the chamfer 17 at the idler 9 within the range of its support zone 19 is covered with a covering made of fine diamond or another hard material grains. In doing so, the torque necessary for providing the machining force, especially for the generating grinding of the

Walter Wirz  
Q67889  
Preliminary Amendment

gearing 7, is slip-free transferred to the workpiece. The axial pressing force for achieving the necessary torque is applied by the centering 10 through the bearing 23 from the holder 16. Not only the centering 9 but also the holder 16 are designed such that they lie outside of the collision contour 20 of the grinding worm 5. The centering 10 has a coaxial through-boring 35 and the centering 9 has a coaxial terminal boring 36. Both borings 35, 36 are slightly larger than the finished diameter of the boring 8 of the gear 6. This is for an unhindered accessabilityaccessibility of the bore by the tool.

**IN THE CLAIMS:**

**Claims 4-10 are canceled.**

**Claim 1 is amended as follows:**

1. Process for the fine machining of functional first surfaces on pre-machined and hardened transmission gear workpieces (6) with a cylindrical boring, said first functional surfaces comprising a gearing, wherein in one and the same fixing of thesaid workpiece on second surfaces not requiring hard machining, thesaid gearing (7) according to a continuously working generating grinding process and, at the same time, thesaid boring (8) are machined.

**Claims 11-14 are added as new claims.**

**IN THE ABSTRACT OF DISCLOSURE:**

**The abstract is changed as follows:**